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Cloud Computing for Business

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ABSTRACT

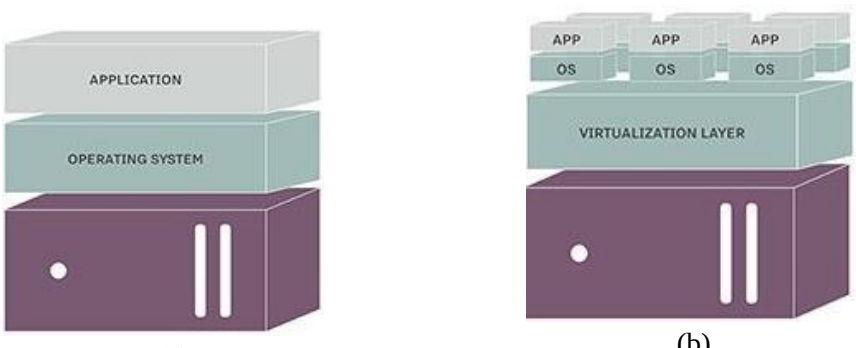
According to the Statists portal, the numbers of consumer cloud-based service users are reaching 3.4 billion, which is almost half of the world's population, in 2018. This statistic clearly shows the cloud computing Technology has been expanding tremendously and it will be the future of Information technology. Cisco, HP and other enterprises IT corporations are introducing cloud-based equipment such as cloud-based wireless controllers, access points, switches, firewall and many other cloud-based infrastructures. Cloud computing is the great paradigm shift of information technology and business should aware of the wave that is shaking the whole industry. The main purpose of this paper is to identify and discuss the key components of cloud computing and cloud services for small to medium size businesses.

Keywords: Cloud computing, Cloud services.

1. INTRODUCTION

Cloud computing technology has been popular in the information technology industries for decades. Many small, medium and enterprise businesses are migrating to cloud technology for many reasons such as storage space, computing resources, infrastructure resources and many other things. If we look at those reasons in very detail, we will see one of the core reasons is the cost of hardware and software. It is obvious that infrastructure in the cloud is a lot cheaper than that of a real physical infrastructure in the business.

Understanding the cloud computing is important to understanding how virtualization technology has been contributing to the computing infrastructure in the IT industries. The evolution of virtualization plays a significant role in creating a clear picture of cloud computing technology today. Before we discuss about the cloud technology and its components, let's take a look a brief about virtualization.



(a) (b)

Figure 1: (a) Traditional Architecture a (b) Virtualization Architecture

Virtualization is the key and the foundation of cloud computing technology. Virtual environment includes, in general, host server and multiple guest servers (VMs) that can run without interfering by sharing I/O, software and hardware resources. Basically, there are four resource areas (servers, storages, network and power) that can be virtualized. Virtual machines (VMs) are another product of software emulation and hardware virtualization techniques. Redhat defined the virtualization and hypervisor as follow,

" Virtualization is technology that allows you to create multiple simulated environments or dedicated resources from a single, physical hardware system. Software called a hypervisor connects directly to that hardware and allows you to split 1 system into separate, distinct, and secure environments known as virtual machines (VMs). These VMs rely on the hypervisor's ability to separate the machine's resources from the hardware and distribute them appropriately."

There are seven types of virtualizations providing numerous benefits including efficient utilization, costs saving and effective management of hardware and software resources for the cloud computing.

Figure 2: Seven types of Virtualization

Virtualization						
Hardware - Full - Bare - Hosted - Partial - Para	**Network** - Internal Network Virtualization - External Network Virtualization	**Storage** - Block Virtualization - File Virtualiztion	**Memory** - Application Level Integration - OS Level Integration	**Software** - OS Level Application Service	**Data** - Database	**Desktop** - Virtual desktop infrastructure - Hosted Virtual Desktop

Virtualization manipulates hardware and software resources and the cloud computing sits on the results of that manipulation.Virtualization and cloud computing are overlapping each other, but the virtualization is not cloud computing. Virtualization is one of the essential technologies that creates cloud computing work. According to "geeksforgeeks, the benefits of Virtualization are as follow,

1.More flexible and efficient allocation of resources.
2.Increase development productivity.
3.It lowers the cost of IT infrastructure.
4.Remote access and rapid scalability.
5.High availability and disaster recovery.
6.Pay for and consume the IT infrastructure as and when you need it.
7.Enables running multiple operating system.

2. CATEGORY OF CLOUD COMPUTING

Cloud computing can be categorized by two ways - based on a cloud location and based on services. The "*Public cloud*", "*Private cloud*" and "*Hybrid cloud*" are the clouds defined by the cloud locations. On the other hand, cloud can be also defined based on a service as follow,

- IaaS (Infrastructure-as-a-Service)
- PaaS (Platform-as-a-Service)
- SaaS (Software-as-a-Service)

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Public Clouds are managed and owned by the cloud provider. All software, hardware and the whole infrastructure are located in cloud provider's data centers. In a public clouds, all clients share the same cloud's infrastructure provided by the providers. Clients can manage and access their accounts via web browsers. Most of the public clouds provide online office application, web mail, storage and development and testing environments.

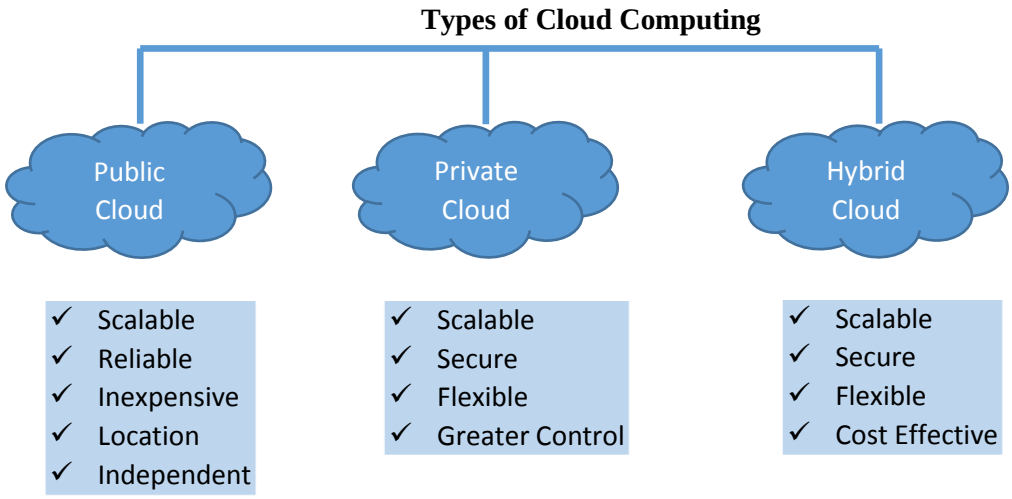

Figure 3: Public, Private and Hybrid cloud

Private clouds, usually own and operate by an organization or business, are located at the on-site datacenter. Some businesses or organizations could be hosted their private clouds in third-party providers, and in this case, their private clouds are sitting on the public cloud infrastructures, but the hardware, software and infrastructure are dedicated solely to the one business or organization for security reasons. Private cloud are more secure than the public cloud and it is suitable for financial institutions, governmental organizations and any other businesses or organizations those have critical information and data.

Hybrid clouds provide greater flexibility and control on resources and data. Hybrid clouds offer a mix of public and private cloud services between the two platforms, and hybrid cloud also provides a couple of models to implement.

Above three cloud types are options for the businesses and organizations to decide the best approach that reflects their needs and requirements. Security would be the top item to think when considering the right cloud type. We will discuss the three cloud services (IaaS, PaaS, and SaaS) that important for cloud computing technology.

3. CLOUD COMPUTING SERVICES TYPES

IaaS (Infrastructure-as-a-Service) could be a business's virtual data center. IaaS is the cloud based infrastructure services that are provided to businesses to help them build and manage their storage, servers, operating systems, and network. The example of real world IaaS are Rackspace, Amazon Web Services (AWS), and Cisco Metapod

PaaS (Platform-as-a-Service) providers offer the software and hardware tools for clients to build and run applications in the cloud. PaaS is a useful service for software developers to deal with hardware-oriented tasks. One of the well-known PaaS solution provider is Microsoft Azure.

SaaS (Software-as-a-Service) providers provide hosted applications to the users via the internet. Most SaaS are web-based interface. SaaS is the services that users can enjoy the products without worrying about the maintenance, update, and backups. The well-known SaaS providers are Dropbox, Google, and Sales force.

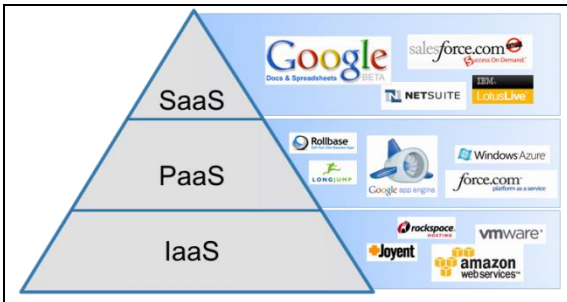	✓ Software as a Service ✓ Email, IM, Facebook, Twitter ✓ Almost every application can be SaaS
	✓ Platform as a Service ✓ Mysql, Mangodb, RabbitMQ.. ✓ CloudFoundary, Openshit
	✓ Infrastructure as a Service ✓ Compute, Storage, Networking ✓ AWS, Google Cloud Platform, Azure, etc.

Figure 4: IaaS, PaaS, and SaaS

Moving the business operations to the cloud can save the company's budget and eliminate the need for expensive servers, hardware and software. Remote employees can access the resources on the cloud from anywhere. However, choosing a right cloud provider for business can be tough. The decision making process should involve business and IT teams to cover all requirements and detail steps for the whole migration process. Business and IT teams also need to manage all possible risks and outcomes that can be happened during and after the migration.

Puneet Shivam, co-head of the outsourcing vertical at Avendus Capital, Inc., said that "Before signing with a cloud provider, make sure that provider is fully committed to understanding your business and the specific objectives you hope to achieve with cloud".

Figure 5: Cloud providers

Security should be the first thing to consider when it comes to moving business critical data in the cloud. This should also include gathering information about the cloud provider's data center such as disaster recovery plan, backup plan, and encryption plan. As stated in Newgenapps, there are 10 steps that ensure successful cloud migration for businesses,

1. Determine why you want to move to the cloud
2. SWOT analysis
3. Assess your environment
4. Selecting the right cloud partner
5. Select the cloud environment needed
6. Determine the architecture
7. Select the right cloud provider (not to be mistaken with partner)
8. Plan the migration
9. Execute
10. Monitor

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4. CLOUD TECHNOLOGY IN BUSINESS

Cloud computing technology brings new opportunities for businesses with a variety of options. Cloud computing provides the businesses with "mobile working environment", which is centralize data place that can share information and resources regardless of employees' geographical locations. Most businesses today are using hybrid cloud in order to get greater business continuity. Business continuity is one of the most significant elements for businesses and hybrid cloud can promise this.

The Top 5 Benefits of Cloud Computing for Businesses are as follows:

- Reduced costs: By moving your company's data to the cloud, you'll have less hardware requirements, which means less maintenance and power costs to you! Also, outsourcing your IT system to a cloud computing vendor reduces or eliminates your need for in-house IT staff.
- Remote access: Storing your information in the cloud allows your employees, partners and clients to access it whenever they want from any location rather than always having to run back to the office.
- Data backup: You don't have to worry about losing your information due to natural disasters or human errors – your information will be remotely stored in the cloud provider's data center, making it easier to establish disaster recovery plans.
- Scalability: Adding or removing capacity won't be an issue because cloud computing gives you the flexibility to modify your levels of required storage, RAM and CPU as your demand grow or decreases.
- Business agility: Cloud computing increases the efficiency of your IT system. This helps to reduce your project delivery time, giving your company an edge over the competition.

For the future, research indicates that over 80 % of businesses are exploring hybrid cloud option. In contrast, private and public clouds are also important for some businesses as options. For instance, some businesses hosted their ERP system in a private or public cloud.

5. CONCLUSION

In summary, cloud computing is a growing information technology area and there are a number of advantages to businesses moving towards fully or hybrid cloud based infrastructures and services. Cloud computing offers efficiency, flexibility, and accessibility. Artificial Intelligence (AI) is another huge thing on the cloud environment. AI can offer the businesses with the complex decision-making, perception, and analyze. Microsoft, Google and Amazon are offering artificial-intelligence services through cloud computing. In the near future, cloud computing will be offering "EaaS" (Everything as a service). Therefore, The future of cloud computing is a chance for a huge technological breakthrough for the companies using this technology today.

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